

# Clinicoetiological study on vaginal discharge among sexually active women attending a tertiary center in North Kerala, India

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## Abstract

**Background:** Vaginal discharge is a common complaint among women attending the sexually transmissible infections (STIs) clinic and is a cause for concern and mental distress. It can be attributed to physiological or pathological causes. This study aims to understand the prevalence of various etiologies of vaginal discharge, which would help frame health policies based on local needs. **Objectives:** (1) To estimate the prevalence of discharge per vaginum among sexually active women attending the STI clinic at a tertiary care center during a 1-year period, (2) To identify the organisms causing vaginal discharge, (3) To have a clinicoetiological correlation of the cases, and (4) To identify the subspecies of *Candida* causing vaginal candidiasis. **Materials and Methods:** A total of 126 patients with vaginal discharge attending the STI clinic at a tertiary care center were included in the study. A detailed clinical history, physical examination of the external genitalia, and vaginal examination were done on each patient. Five swabs were taken from the posterior fornix and lateral vaginal wall for evaluation of the organisms. **Results:** The mean age of the study population was  $31.51 \pm 7.9$  years. Vulvovaginal candidiasis (VVC) was found to be the most common cause of vaginal discharge, followed by bacterial vaginosis, mucopurulent cervicitis, herpes genitalis, and trichomoniasis. The most common species of *Candida* was found to be *Candida albicans*. **Conclusion:** Even though VVC still remains the major cause, other viral infections like herpes significantly contribute. Vaginal discharge is an important indicator of women's reproductive health and its detailed evaluation helps identify the prevalence of various STIs in the community.

**Key words:** Bacterial vaginosis, candidiasis, gonorrhea, leukorrhea, trichomoniasis

## Introduction

Vaginal discharge is a frequent complaint among women attending sexually transmissible infections (STIs) clinics.<sup>[1]</sup> Globally, every one in ten women presents with vaginal discharge in a year. These can be attributed to physiological or pathological causes.<sup>[2]</sup> Pathological causes can be due to both infectious and noninfectious etiologies.<sup>[2]</sup> Bacterial vaginosis (BV) is the most common physiological cause of white discharge, while pathological causative organisms include *Candida* spp., *Neisseria gonorrhoeae* (3.7%–27.77%), herpes simplex (7.9%–14.6%), and *Mycoplasma*.<sup>[3–5]</sup> Apart from pathological

causes, psychosocial factors also contribute to vaginal discharge.<sup>[6]</sup> Hence, the problem of vaginal discharge is best understood from biomedical and sociocultural perspectives. The prevalence of various infectious causes varies between communities.<sup>[1]</sup> It reflects the standard sexual practices, accessibility to health care, and preventive steps taken. There is limited literature available on the regional variability of the problem. This study will help understand the prevalence of various etiological causes of

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vaginal discharge in our population. We have included both vaginal and cervical causes of discharge and evaluated the clinical and microbiological aspects of vaginal discharge in detail. Ultimately, a proper understanding of this problem will help initiate appropriate medical education programs and frame health policies based on local needs.

### Objectives

#### Primary

To estimate the prevalence of discharge per vaginum among sexually active women attending the STD clinic during a 1-year period.

#### Secondary

1. To identify the organisms causing vaginal discharge
2. To have a clinicoetiological correlation of the cases
3. To identify the subspecies of *Candida* causing vaginal candidiasis.

### Materials and Methods

A cross-sectional study was conducted among the patients attending the STI clinic of a tertiary care institution with a history of discharge per vaginum during the period of 1 year from January 2016. All women attending the clinic with complaints of vaginal discharge, who consented to participate and did not fall under the exclusion criteria, were included in the study. Pregnant women, patients who had used topical or systemic antibiotics or antifungals within the past 2 weeks, and patients who refused to give consent were excluded from the study.

Calculation of sample size: Sample size was calculated using the formula  $4pq/d^2$ . Here,  $P$  is the prevalence,  $q$  is calculated by  $(100 - p)$ , and  $d$  is taken as 20% of the  $P$  value. Assuming,  $P$  as 45% based on a previous study, the sample size was calculated as 122, which was rounded off to 126.

#### Methodology

The study was commenced after obtaining clearance from the institutional research committee and institutional ethics committee. After obtaining informed written consent, a detailed clinical history regarding the quantity, color, smell of discharge, and associated symptoms such as fever, pain, itching, dysuria, and dyspareunia were taken, followed by a thorough physical examination of the external genitalia. The vaginal examination was done with a sterilized Cusco's speculum to look for erythema, erosions, vesicles, and discharge. The quantity, character, consistency, and pH of the discharge were noted. Five swabs were taken from the posterior fornix, cervix, and lateral vaginal wall. They were subjected to wet mount microscopy, one drop of 10% KOH, followed by microscopic examination, whiff test, inoculated into Sabouraud's dextrose agar medium, followed by subculture into CHROMagar, Gram stain, and Tzanck smear, respectively. Candidiasis was considered when the patient presented with the thick curdy white discharge with candidal pseudohyphae and or spores on 10% KOH examination, and culture showing creamy white colonies in *Candida albicans* and blue colonies in *Candida tropicalis*.

BV was diagnosed when a patient presented with a homogenous white discharge with a fishy odor and positive whiff test, and presence of clue cells, and a pH in the range of 5.5–6.5.

Mucopurulent cervicitis was diagnosed when the patient presented with the mucopurulent discharge with pus cells

on Gram's stain and no reniform diplococci, whereas gonococcal cervicitis was confirmed when the patient presented with purulent discharge and reniform diplococci with pus cells on Gram's stain. If multinucleated giant cell was seen on Tzanck smear with painful ulcers and purulent discharge, a diagnosis of herpes genitalis was made. Trichomoniasis was diagnosed when the patient presented with profuse yellowish-green discharge with a pH in the range of 3.5–4.5 and wet mount showing highly motile *Trichomonas vaginalis*.

#### Data analysis

The data were tabulated using Microsoft Excel and analyzed with Statistical Packages for the Social Sciences software version 23.0.

Statistical analysis was done using summary statistics of mean  $\pm$  standard deviation, Chi-square test, and Freeman-Halter-Fisher test.  $P < 0.05$  was taken as statistically significant.

### Results

Out of the 450 women who attended the STI clinic during a 1-year period, 126 patients with complaints of vaginal discharge were included in the study. The mean age of study participants was  $31.51 \pm 7.9$  years, and all of them were married. Majority of the study participants (100, 79.4%) belonged to lower socioeconomic status, while 26 (20.6%) were from higher socioeconomic status and 23 (18.3%) patients had a history of multiple sexual partners.

The most common complaint other than vaginal discharge among the study subjects was pruritus in 91 (72.2%), followed by dyspareunia in 24 (19.0%), excoriation in 19 (15.1%), premenstrual flare-up in 16 (12.7%), abdominal pain in 14 (11.1%), dysmenorrhea in 17 (13.5%), dysuria in 10 (7.9%), fever in 12 (9.5%), and ulcer in 15 (11.9%) patients, respectively. The prevalence of vesicle, pain, and postcoital bleeding as a presenting symptom was noted in 7 (5.6%), 11 (8.7%), and 2 (1.6%), respectively. The prevalence of symptomatic partners in women with complaints of vaginal discharge was found to be 8.7% (11) patients.

On examination, there was visible vaginal discharge in 119 patients (94.4%). Other prominent findings included erythema, maceration, ulcers, and vesicles. Six patients had no significant findings on examination despite complaining of vaginal discharge [Table 1]. The cervix presented with various clinical examination findings ranging from erythema in 38 (30.2%), edema in 23 (18.3%), discharge in 38 (30.2%), bleeding in 15 (11.9%), tenderness in 30 (23.8%), and ulcer in 10 (7.9%) out of the 126 women subjected to study. The cervix was found to be normal in 67 (53.2%) of the patients.

#### Characteristics of vaginal discharge

The prevalence of curdy white discharge was found to be 38.1% (48), purulent in 28.6% (36), thin homogenous white in 23.0% (29), white mucoid in 7.1% (9), yellowish green in 1.6% (2), serous in 1.6% (2), and discharge with fishy odor in 11.9% (15) of the patients.

#### Etiology of vaginal discharge

The most common cause of vaginal discharge was found to be vulvovaginal candidiasis (VVC) in 51 (40.5%) patients, followed by BV in 25 (19.8%), mucopurulent cervicitis in 23 (18.3%), herpes genitalis in 18 (14.3%), and trichomoniasis in 1 (0.8%). In eight (6.3%) patients,

the cause of discharge was determined to be physiological. More than one cause was identified in seven of the patients. VVC and BV were seen together in three patients, and herpes genitalis and VVC were seen together in four patients. [Table 2].

In VVC, the most common type of vaginal discharge was thick (46, 90.2%), curdy white (48, 94.1%), and of moderate quantity (35, 68.6%). The vaginal pH in the range of 3.5–4.5 (49, 96.1%) was significantly associated with VVC ( $P < 0.000$ ). The culture positivity for *C. albicans* was 70.6% (36), and *C. tropicalis* was 25.5% (13) which was significant at a 95% confidence interval (CI) ( $P < 0.000$ ) [Figure 1a and b]. It was possible to demonstrate candidal pseudohyphae and/or spores

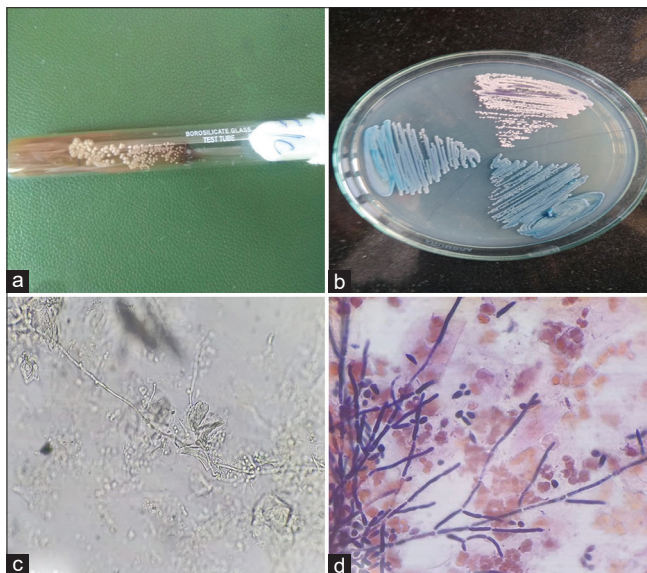
**Table 1: Clinical findings in the vagina**

Clinical findings in the vagina	n (%)
Discharge	119 (94.4)
Erythema	94 (74.6)
Maceration	56 (44.4)
Ulcer	13 (10.3)
Vesicle	1 (0.8)
Normal	6 (4.8)

**Table 2: Final diagnosis of the cause of vaginal discharge**

Causes of vaginal discharge	n (%)
VVC	51 (40.5)
BV	25 (19.8)
Mucopurulent cervicitis	23 (18.3)
Herpes genitalis	18 (14.2)
Trichomoniasis	1 (0.80)
Others	2 (1.6)
Physiological causes	8 (6.3)

VVC=Vulvovaginal candidiasis; BV=Bacterial vaginosis



**Figure 1:** (a) Sebraud's dextrose agar showing creamy white colonies of *C. albicans*; (b) chrome agar showing blue colonies of *Candida tropicalis* and white to light green colonies of *Candida albicans*; (c) Candidiasis. Patient with curdy white discharge showing pseudohyphae on 10% KOH smear (×400); (d) Candidiasis. Pseudohyphae on Gram's stain (×400).  
*C. albicans* = *Candida albicans*; *C. tropicalis* = *Candida tropicalis*

on 10% KOH and Gram's stain in 49 (96.1%) of the patients [Figure 1c and d].

In BV, the most common type of vaginal discharge was thin (25, 100%), homogenous white (23, 92.2%), and of moderate amount (17, 68%). Positivity on the whiff test was noted in 96.1%, but clue cells were seen only in 6% [Figure 2a]. pH in the range of 5.5–6.5 was seen in 72%, which was significant at 95% CI ( $P < 0.05$ ).

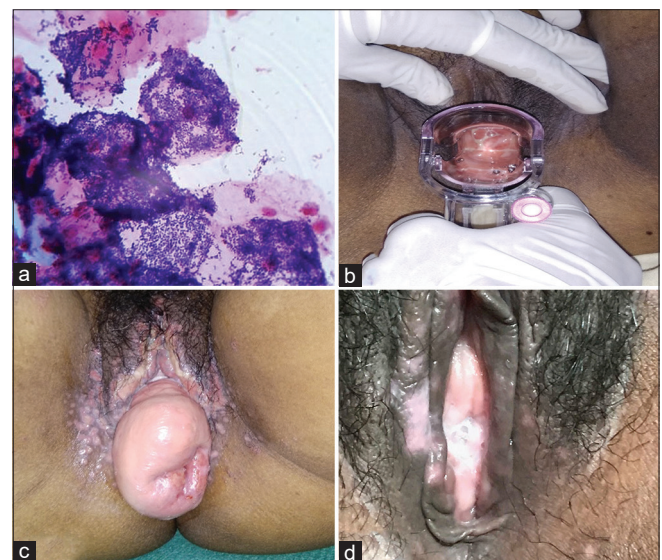
In mucopurulent cervicitis, the most common type of vaginal discharge was mucopurulent (23, 100%) [Figure 2b]. The majority of the patients described the discharge to be of moderate quantity (18, 78.3%) and 96.1% had pus cells on Gram's stain and no reniform diplococci. Most of them had a vaginal pH between 4.5 and 5.5 (17, 73.9%), which was statistically significant with a  $P < 0.000$ .

In herpes genitalis, the most common type of vaginal discharge was purulent (12, 66.7%), thick (10, 55.6%), and of moderate quantity (13, 72.2%) [Figure 2c]. Tzanck smear showed multinucleated giant cells in 13 (44.4%) patients. The discharge in trichomoniasis was profuse, yellowish green with pH between 3.5 and 4.5, with wet mount showing motile trichomonads [Figure 2d].

## Discussion

A total of 450 women in their reproductive age group attended the STD clinic during the period 2016–2017. The mean age in the present study was similar to the finding reported by Guntoory *et al.* who found 74% of them in the age group of 25–44 years.<sup>[7]</sup> The prevalence of women with vaginal discharge as their primary complaint was found to be 28%. Most of the patients in our study belonged to lower socioeconomic status (79.4%), while Patel *et al.* only reported 27.7% of their patients in lower socioeconomic status.<sup>[6]</sup> The higher prevalence in our study may be due to easy approachability to these lower-income patients, as the study center is a government tertiary care center.

The most common presenting complaint was itching, followed by dyspareunia, excoriation, and premenstrual



**Figure 2:** (a) Bacterial vaginosis. Clue cells revealed in Gram's stain (×400); (b) speculum examination showing mucopurulent cervicitis; (c) revealing primary herpes genitalis with prolapse uterus and purulent discharge; (d) revealing yellowish green frothy discharge in trichomoniasis



flare-up of symptoms in our study. This is comparable to the study carried out by Patel *et al.*, who reported a prevalence of itching in 39.6%, lower abdominal pain in 30.2%, blisters or ulcers in 12.7%, and dysuria in 19.7%.<sup>[8]</sup> Another study by Venugopal *et al.* described pruritus present in 60% of cases and lower abdominal pain in 45% of their cases.<sup>[9]</sup> All patients in our study were married and 19% had multiple sexual partners. A discordant finding was reported by Bogaerts *et al.*, where only 0.2% of married women admitted an extramarital partner.<sup>[10]</sup> Furthermore, Patel *et al.* reported that only 33% of patients had concerns about husbands having multiple sexual partners.<sup>[8]</sup> The higher prevalence of married women in our study may be due to sociocultural factors in our country where most of them customarily get married.

There have been only few previous studies describing the details of examination findings of vulvovaginitis and cervicitis in such detail with thorough clinical examination with keen observation of the amount, consistency, color, and pH of each vaginal discharge as done in our study. In the present study, 18.3% had erythema over external genitalia. Other findings over external genitalia included maceration in 11.1%, ulcer in 14.3%, vesicle in 3.2%, discharge in 26.2%, condyloma lata in 1.6%, and normal in 61.1%. Vulvar erythema being the most common examination finding in our study, was dissimilar to the study by Sivaranjini *et al.*, who described vulvar erythema in 5.25%, vulvar excoriation in 11.75%, and vaginal erythema in 7.3%.<sup>[11]</sup> Furthermore, Rathod *et al.* reported vaginal discharge in 35.4% and erythema in 9.5% of their patients.<sup>[12]</sup> Examination of the cervix revealed erythema in most patients (30.2%), followed by edema (18.3%), discharge (30.2%), bleeding (11.9%), tenderness (23.8%), and ulcer (7.9%). In an Indian study conducted by Patel *et al.*, the prevalence of ulcers was found to be 12.7% which is comparable to our study.<sup>[8]</sup> Furthermore, Sivaranjini *et al.* described cervical erythema in 3.3% of patients in their study.<sup>[11]</sup> The difference in the prevalence of examination findings may be related to the final diagnosis.

In the present study, the prevalence of curdy white discharge suggestive of candidiasis was the highest (38.1%), followed by a mucopurulent discharge representative of cervicitis in 28.6%, thin homogenous white as in BV in 23%, white mucoid in 7.1%, serous in 1.6%, and yellowish green as in trichomoniasis in 1.6%. A similar finding was also reported by Venugopal *et al.* and Ray *et al.* in their study.<sup>[9,13]</sup> Our findings were also comparable with the studies carried out by Meena and Bansal, and Puravoor *et al.* who reported candidiasis, followed by BV as the most common cause of the vaginal discharge.<sup>[14,15]</sup> Patients with VVC had a thick curdy white discharge of moderate quantity. The majority showed positivity on the 10% KOH stain and showed growth in culture. Similar findings were reported by Rathod *et al.* and Spence and Melville in their studies.<sup>[12,16]</sup> On subculturing, the significant *Candida* species was *C. albicans*, followed by *C. tropicalis*. Similarly, Grigoriou *et al.* reported *C. albicans* as the dominant isolate in their study population.<sup>[17]</sup>

BV patients presented with thin homogenous discharge in moderate quantity. The majority showed positivity on the whiff test. Eschenbach *et al.* reported similar characteristics of discharge in their patients with BV.<sup>[18]</sup> The vaginal pH in BV was high, which is in concordance with the finding of Krohn *et al.*<sup>[19]</sup> Mucopurulent cervicitis presented with

purulent mucoid discharge in moderate quantity. The majority stained positive in Gram stain at a high vaginal pH. In herpes genitalis, the vaginal discharge was purulent, thick, and moderate in amount. Puravoor *et al.* reported a similar finding in their study.<sup>[15]</sup> Folkers *et al.* noted the sensitivity of Tzanck smear in the diagnosis of herpes genitalis to be between 52% and 81% which is slightly higher compared to our finding of 44.4%.<sup>[20]</sup> The prevalence of trichomoniasis was low in our study, supported by the finding of Puravoor *et al.*<sup>[15]</sup> Only a few physiological causes of vaginal discharge were seen, which is in contrast to the study carried out by Sivaranjini *et al.*, where the prevalence of physiological discharge was 18%.<sup>[11]</sup> The lower prevalence of physiological discharge may be due to the referral nature of our study center. Miscellaneous causes included one as a case of excessive use of soap and the other attributed to the use of a commercially available vaginal wash. Here, the patient had complaints of whitish discharge. External genitalia, vagina, and cervix were normal with whitish mucoid discharge. Microscopy and culture of the discharge were normal.

In our study, more than one cause was identified in seven of the patients. VVC and BV were seen together in three and herpes genitalis in association with VVC were seen in four patients. No statistical association was noted between diabetes mellitus and VVC in our study. Previous studies have not mentioned herpes genitalis as an important cause of vulvovaginitis and cervicitis, thus undermining their role as an important cause of the vaginal discharge. The high prevalence of such cases in our study may be due to the tertiary nature of our clinic. Its importance is thus highlighted through our data. The very low prevalence of trichomoniasis may be due to the use and abuse of nitramidazine group of drugs (tinidazole, metronidazole, etc.) in the periphery.

#### Limitations

The study took place in a tertiary center and this may explain the increased incidence of viral infections. The use and abuse of antibiotics in the periphery might have undermined bacterial causes of vaginal discharge in our population.

#### Conclusion

Thus, vaginal discharge is an important indicator of women's reproductive health. There has been a significant rise in *Candida* and viral infections. Meticulous evaluation of vaginal discharge regarding the symptoms, characteristic features, and appropriate laboratory testing will give a clue in achieving early diagnosis and treatment which will decrease the suffering of women population. Furthermore, knowing the etiological agents will contribute to formulating health programs and therapeutic guidelines.

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#### Conflicts of interest

There are no conflicts of interest.

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